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Fig. 1  
(preferably when)

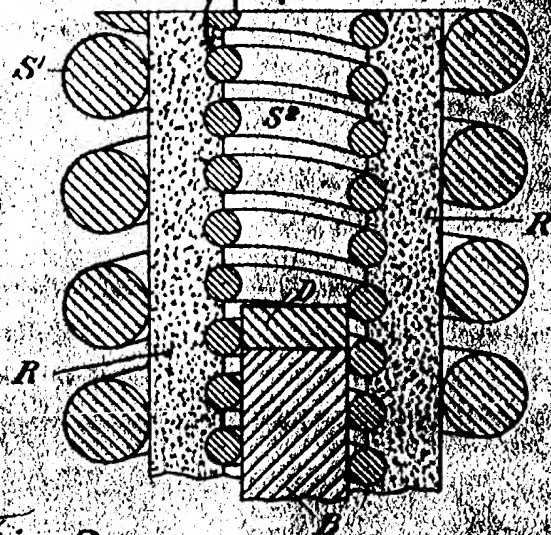


Fig. 2.

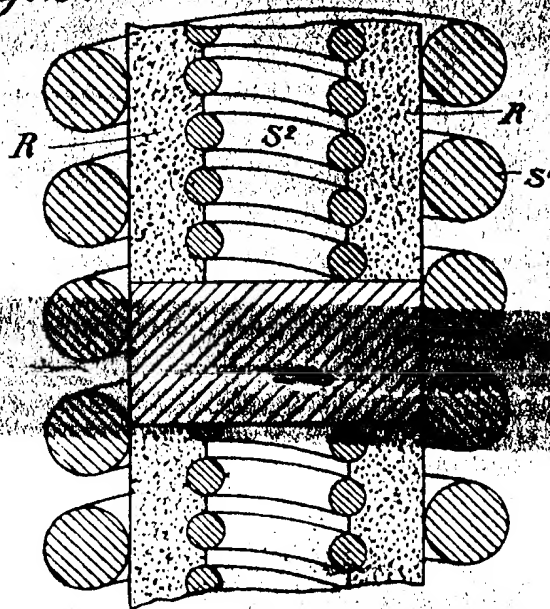




Fig. 3.

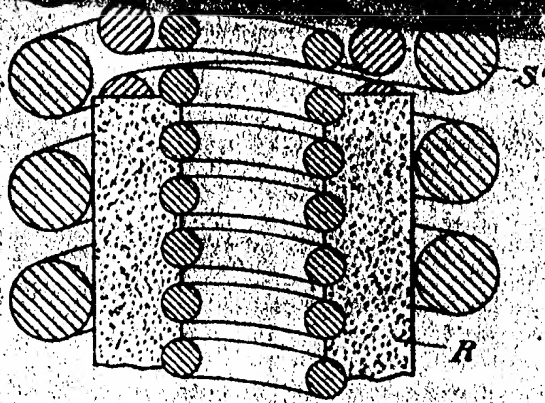
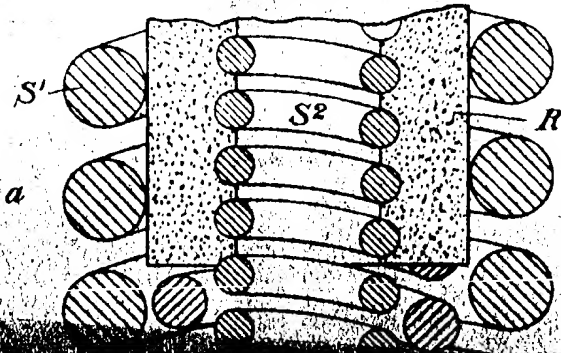
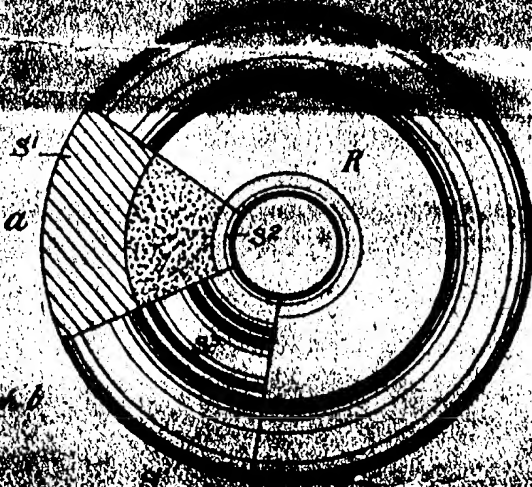


Fig. 4.



Spring  
Coil & Rubber.



N 3698



DECEMBER  
A.D. 1900

*Date of Application, 26th Feb. 1900.  
Complete Specification Left, 26th Nov. 1900—Accepted, 31st Dec. 1900*

## PROVISIONAL SPECIFICATION.

### Improvements in Compound Coiled Springs.

WE, BENJAMIN FREDERICK COCKER, of Fitzalan Works, City of Sheffield, Managing Director, and JOHN BISHOP, of 12, Avondale Road, City of Sheffield, Contractor, do hereby declare the nature of our invention to be as follows:—

Our present invention relates to improvements upon our prior invention described in the Specification of Letters Patent No. 5302 of 1886.

It refers more particularly to short compound springs such as are used for the bearing springs of tramcars, the bumper springs of colliery cages and like purposes, to increase their strength and the life of the rubber portions.

For tramcar bearing springs we use an outside spring and an inside spring and between them we place short tubular lengths of rubber divided by short coiled springs, or in some cases by thick washer like blocks of solid material.

For colliery cage bumper springs consisting of an inside and an outside spring of coiled steel, we place between the two a sleeve of rubber and we fill the inside spring with cylindrical blocks of rubber separated with intermediate blocks or discs of non-elastic material.

Dated the 23rd day of February 1900.

ROBT. F. DRURY, C.P.A.,  
Agent for Applicants,  
Bank Buildings, George Street, Sheffield.

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## COMPLETE SPECIFICATION.

### Improvements in Compound Coiled Springs.

WE, BENJAMIN FREDERICK COCKER, of Fitzalan Works, City of Sheffield, Managing Director, and JOHN BISHOP, of 12, Avondale Road, City of Sheffield, Contractor, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:

Our present invention relates to improvements upon our prior invention described in the Specification of Letters Patent No. 5302 of 1886.

It refers more particularly to short compound springs such as are used for bearing springs in tramcars, the bumper springs of colliery cages and other like purposes, the object being to increase the strength, and also to prolong the life of the rubber parts of same.

Springs made according to the invention are shown in the annexed sheets of drawings in which

[Price 8d.]

*Cocker and Bishop's Improvements in Compound Coiled Springs.*

Fig. 1, is a vertical section of a portion of a spring according to one arrangement.

Fig. 2, a similar view of another construction.

Fig. 3, a similar view of another spring.

Fig. 4, plan and sections of same.

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In carrying out our invention as shown in Fig. 1, we use an outside coiled spring  $S^1$ , and an inside coiled spring  $S^2$ , and between the two we place a rubber sleeve  $R$ , which may consist of one or more lengths, and which is preferably vulcanised upon the inside spring  $S^2$ .

Within the central tubular space of the inside spring we place blocks of rubber  $B$ , separated by intermediately placed discs  $D$ , of metal, wood or other non-elastic material.

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According to the modification shown in Fig. 2 we use the outside spring  $S^1$ , as before, and inside springs  $S^2$ , made in short lengths, also short rubber sleeves  $R$ , both the sleeves and the inside springs being separated by and resting upon solid blocks of wood or metal  $M$ , or these blocks may be made with a centre hole and the central or inside spring be passed through it.

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Blocks and discs  $B$  and  $D$ , as in Fig. 1, may also be used in combination with this arrangement.

A further modification is shown in Fig. 3, in we use the outside spring  $S^1$ , inside spring  $S^2$ , short rubber sleeves  $R$ , between which we place short coiled springs  $S^3$  bearing against the ends of the said sleeves for which purpose they are suitably prepared.

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This modified construction of spring is very suitable for tramcar bearing springs being easy in its action, and very durable.

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Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim, is:

1. The improvements in compound coiled springs as hereinbefore described and shown in Figs. 1, 2 and 3 of the annexed drawings.

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2. A compound coiled spring having an outside steel spring  $S^1$ , an inside spring  $S^2$ , an intermediate sleeve of rubber  $R$ , and a series of cylindrical blocks of rubber  $B$ , separated by discs  $D$ , all in combination, as hereinbefore described and shown in Fig. 1 of the drawings.

3. A compound coiled spring, having an outside steel coil, a series of inside steel coils and of intermediate rubber sleeves, separated by discs of non-elastic material, such as hereinbefore described, and as shown in Fig. 2 of the drawings.

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4. A compound coiled spring having an outside steel coil, and an inside coil, with intermediate sleeves of rubber separated by short coils of steel springs, and with or without central blocks and discs as shown in Fig. 1, substantially as described, and shown in Figs. 3 and 4.

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Dated the 22nd day of November, 1900.

ROBT. F. DRURY, C.P.A.,  
Agent for Applicants.